

The birds of Adonara, Lesser Sundas, Indonesia

COLIN R. TRAINOR

A brief survey of the island of Adonara increased the known avifauna from seven to a total of at least 50 bird species, composed of 24 non-passerines (one introduced) and 26 passerines (one introduced). Nineteen forest birds and five migrants have been recorded for the island. Birds of conservation significance include the Critically Endangered Yellow-crested Cockatoo *Cacatua sulphurea* (near-extinct on Adonara) and six restricted-range species (all endemic to the Lesser Sundas). The most notable of these are White-rumped Kingfisher *Caridonax fulgidus*, Russet-capped Tesia *Tesia everetti* and Olive-headed Lorikeet *Trichoglossus euteles*. Adonara delimits the easternmost range of the former two species, and the westernmost range of the latter. An additional species, Wallacean Cuckooshrike *Coracina personata*, is endemic to Wallacea. Extensive habitat loss, including widespread conversion of forest to coconut plantations, intensive slash-and-burn agriculture, and capture for the cagebird trade (e.g. Yellow-crested Cockatoo and Hill Myna *Gracula religiosa*) have undoubtedly had great effects on the forest-bird communities on Adonara. Conservation proposals for the Ile Boleng area are discussed.

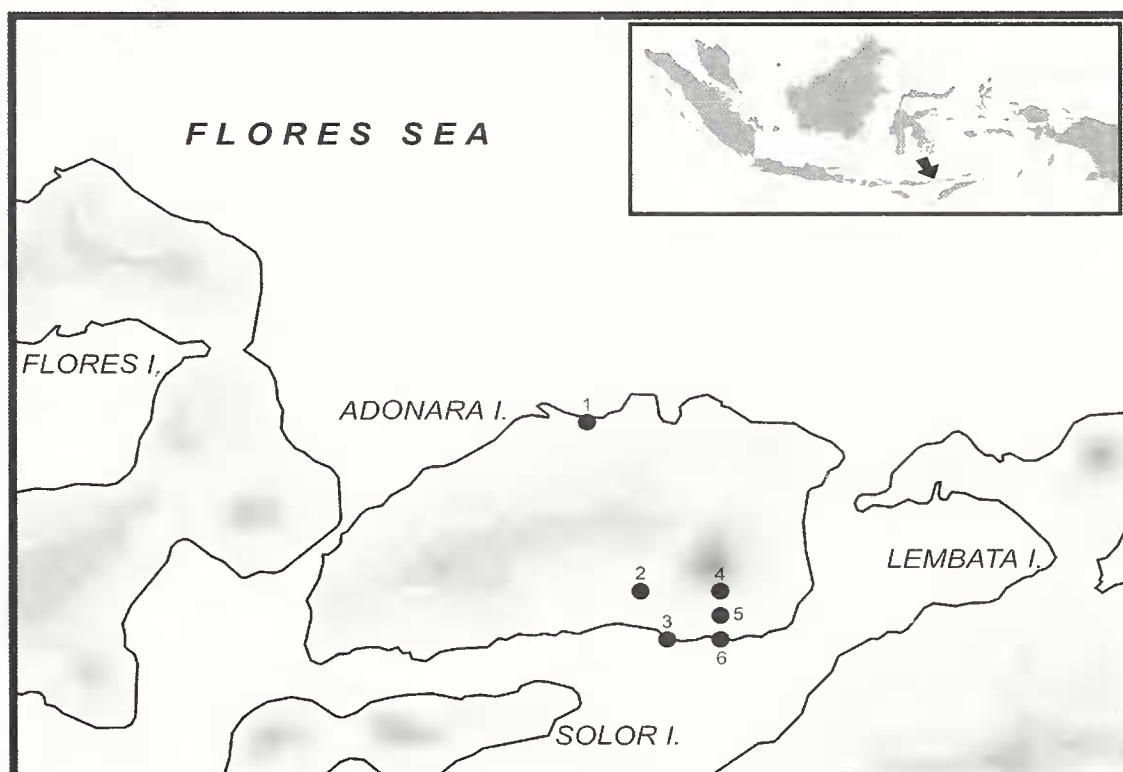
INTRODUCTION

Adonara Island

Adonara is roughly 30 km wide by 18 km long. With an area of some 497 km² it is the thirteenth largest island in the Lesser Sundas. It lies in the Solor archipelago (with Solor and Lomblen, the latter noted as Lembata hereafter) and is one of a string of volcanic islands from Lombok in the west to Alor (and beyond) known as the inner Nusa Tenggara volcanic arc. The large island of Flores is only 1 km off the west coast of Adonara, Solor is 3-10 km to the south and Lembata is 5-10 km to the east. The geology is volcanic with a limited extent of raised coralline limestone in the north-west and patches

of alluvium along the south and west coasts (Noya and Koesoemadinata 1990). Mount Ile Boleng, an active volcano peaking at 1,659 m, dominates the island, with steep hills throughout covered in thickets of secondary tropical dry forest and coconut plantations. The climate is dry tropical with 90% of the rainfall (c.1,000-2,000 mm) concentrated between November and March, and a long rainless dry season from April to October.

The human population density (165 people/km²) is more than double the national average (Monk *et al.* 1997). 'While such a population density would not be excessive in an agriculturally intensive area like Java, in a swidden-based savanna area like Adonara, it is ecologically catastrophic' (Lutz 1998). Natural habitats



1, Kampung Adonara; 2, Wai Kenawe River; 3, Waiwerang; 4, Ile Boleng; 5, Dokeng; 6, Ile Boleng Beach.

Figure 1. Map of study sites on Adonara, Lesser Sundas.

now appear to cover less than about 10% of the land area (author's unpublished data), which is considerably lower than the overall average of 28% for the islands of Flores through to Alor (RePPPProT 1989). There are no conservation areas, although a proposal for the Ile Boleng area was made in the early 1980s by FAO/UNDP. Dryland agriculture using slash-and-burn techniques has been the dominant livelihood activity for generations, with cash crops such as coconut (for copra), cashew and candlenut being the major exports.

Ornithological history

The ornithological history of Adonara is rather brief. J. Semmelink visited Adonara early in 1862 and collected one bird (Elegant Pitta *Pitta elegans*); Colfs collected at least two species in August 1880 (Ruddy Turnstone *Arenaria interpres* and Asian Paradise-flycatcher *Terpsiphone paradisi*), and H. F. C. ten Kate collected four additional species in May 1891: Collared Kingfisher *Todiramphus chloris*, Golden Whistler *Pachycephala pectoralis*, Brown-throated Sunbird *Anthreptes malacensis* (cf. Büttikofer 1892), and Black-naped Oriole *Oriolus chinensis* (G. Mees verbally 2001). Mees (1976) originally credited Governor-General J. W. van Landsberge as the collector of the Ruddy Turnstone in August 1880, but perhaps Landsberge only forwarded the specimen to Leiden.

Documentation of the few avifaunal records for Adonara has been neglected, with White and Bruce (1986) and Bruce (1987) listing only five species (overlooking Asian Paradise-flycatcher and Black-naped Oriole). More recent surveys targeting the Yellow-crested Cockatoo *Cacatua sulphurea* and Hill Myna *Gracula religiosa* were conducted on the northern slopes of the Mount Ile Boleng, but neither species was recorded (Mochtar 1989). However, observations of an additional five species were listed, with varying levels of reliability: 'Philemon inornatus' (presumably Helmeted Friarbird *Philemon buceroides*), 'Corvus sp', 'Geopelia sp', 'Trichoglossus haematodus' (presumably Olive-headed Lorikeet *Trichoglossus euteles*), and 'Elanus hypoleucus' (presumably Black-winged Kite *Elanus caeruleus* or Spotted Kestrel *Falco moluccensis*). Furthermore, Johnstone (1994) describes numerous seabird and shorebird observations from the Lesser Sundas, and indicates that significant time was spent in October–November 1989 surveying the islands of Flores, Adonara and Lembata. However, somewhat inexplicably, no bird

records are reported for the seas or coastline fringing Adonara.

A recent review of the birds of the islands of Flores by Verhoeve and Holmes (1999) listed only five bird species recorded in the 19th Century for Adonara, and stresses that the islands in the Solor and Alor archipelagos (including Adonara, Solor, Lembata, Pantar and Alor), east of Flores, have been 'sadly neglected'. They appealed for further surveys. The isolation of Adonara, its small size, and knowledge of the lack of natural forest habitats have undoubtedly discouraged visits by ornithologists. The islands of Lombok through to Alor, including Sumbawa, Flores, Adonara and numerous small ones, comprise the Northern Nusa Tenggara Endemic Bird Area (EBA) – a high priority for conservation action. The EBA is characterised by twenty-nine restricted-range bird species (those with distributions of less than 50,000 km²), including 17 species found nowhere else in the world (Stattersfield *et al.* 1998).

METHODS

This paper is based on ornithological observations at six sites on Adonara (Fig. 1) during 14–18 December 2000. Birds were recorded opportunistically, and their relative abundance was assessed from 12 ten-species lists (adapted from the 20-species lists described in MacKinnon and Phillipps 1993: the first ten bird species encountered in a sample area were listed, then a new list was started, and so on until 12 lists had been completed). This method was not confined by either survey area (although usually each list was collected within an area of c. 1–3 ha) or time. Informal discussions about birds were also carried out with local people. The aim of this brief survey was to list additional bird species for the island and to produce an inventory, with relative abundance and habitat use.

SELECTED SPECIES ACCOUNTS

WHITE-RUMPED KINGFISHER *Caridonax fulgidus*

Restricted-range

This species belongs to a monotypic genus; it is endemic to the North Nusa Tenggara EBA, and previously it was known from Lombok, Sumbawa, Flores and Pulau

Table 1. Summary of localities surveyed on Adonara. Habitats: A = village, B = mangrove, C = agricultural crops, D = coastal scrub, E = plantations (coconut and candlenut), F = tropical dry forest, G = moist deciduous forest, H = seasonal montane forest dominated by *Eucalyptus urophylla*.

Study sites	Survey dates	Coordinates	Altitude (m)	Habitats								
				A	B	C	D	E	F	G	H	
Kampung Adonara (Danau Kota Kaya)	17 Dec	8°15'S 123°10'E	0-100	✓	✓		✓					
Wai Kenawe River	18 Dec	8°22'S 123°12'E	200-400								✓	
Waiwerang	14-18 Dec	8°24'S 123°13'E	0-100	✓		✓	✓					
Ile Boleng	16 Dec	8°21'S 122°15'E	500-900					✓			✓	✓
Dokeng	15-16 Dec	8°23'S 123°15'E	300-400	✓				✓				
Ile Boleng Beach	15 Dec	8°24'S 123°15'E	Sea-level				✓					

Besar. It was frequently heard calling at the Wai Kenawe River and in fragments of closed-canopy forest on the slopes of Ile Boleng (500-700 m). A single bird was observed in flight in a candlenut plantation near Dokeng. These records on Adonara fill a gap in knowledge of the species's distribution. The White-rumped Kingfisher remains unrecorded from nearby Lembata (author's unpublished data) and Alor (White and Bruce 1986) with Adonara probably delineating the eastern limit of its range. On Flores, this species is ubiquitous in forest (Trainor and Lesmana 2000).

OLIVE-HEADED LORIKEET *Trichoglossus euteles*

Restricted-range

This species was recorded only on the slopes of Ile Boleng, where it was frequently heard or observed, usually in flight, in small parties of 2-10 individuals. Several flew over a candlenut plantation and fruit gardens at 300-400 m at Dokeng on 15 December. The following day at the same locality there were 15-20 contacts of 2-10 individuals from 300-900 m, perhaps more frequently above 600 m. Observations at 350-450 m included at least one heard in flight, several heard roosting noisily in the canopy, and four in flight over a candlenut plantation. At 600-700 m there were several observations of pairs flying over fruit gardens and cornfields. At 750-900 m in successional closed forest and *Eucalyptus urophylla* open forest the species was notably common with about 10 contacts of small parties in 1 hour. These were observed in the canopy of *Eucalyptus* trees, and were presumably feeding on blossoms. The Olive-headed Lorikeet is endemic to the Lesser Sundas where it is known from 14 islands, namely Timor, Wetar, Lembata, Pantar, Alor and nine of the 'south-west islands' (Coates and Bishop 1997). It was therefore to be expected for Adonara.

YELLOW-CRESTED COCKATOO *Cacatua sulphurea*

Critically Endangered

Unrecorded. According to local people, this species is probably nearing extinction on Adonara as a result of capture for the cagebird trade, and persecution (shooting) because of its status as a crop pest. A Dutch priest stated that people from Kupang intensively trapped Yellow-crested Cockatoos on Adonara in the 1980s. He had not seen wild Yellow-crested Cockatoos since about 1985. Informants indicated that cockatoos are extant in the Witiana district of north-east Adonara (behind the Ile Boleng volcano), and that several Yellow-crested Cockatoos were observed in crops near Kampung Adonara in 1999.

BARN OWL *Tyto alba*

A large, light-coloured owl briefly observed crossing the road 1 km E of Waiwerang at 19h00 on 15 December was presumed to be this species. Coates and Bishop (1997) regard it as uncommon and local but possibly overlooked in Wallacea. However, numerous recent records in the Lesser Sundas indicate that this species is common, probably especially in the vicinity of villages where commensal small mammals are typically abundant (Sumbawa, Flores, Lembata, Alor and Damar: author's unpublished data). The Grass Owl *Tyto capensis* is a possible confusion species, but is rarely reported in Nusa Tenggara (Coates and Bishop 1997).

ROCK PIGEON *Columba livia*

Introduced

This species is common in Waiwerang, and it was also observed at the village of Trong, about 12 km to the west.

BROWN CUCKOO DOVE *Macropygia amboinensis*

A pair were seen perched in a coconut tree in mixed candlenut plantation and gardens near Dokeng at 460 m on 15 December.

BLACK-BACKED FRUIT DOVE *Ptilinopus cinctus*

This species was occasionally heard calling from moist deciduous forest on the slopes of Ile Boleng (700-900 m), and along the Wai Kenawe River.

BONELLI'S EAGLE *Hieraaetus fasciatus*

Two were observed soaring over dry agricultural land and closed-canopy forest on the southern slopes of Ile Boleng (900 m) on 16 December.

LITTLE EGRET *Egretta garzetta*

A single bird was observed in flight over Danau Kota Kaya on 17 December.

WALLACEAN CUCKOOSHRIKE *Coracina personata*

This Wallacean endemic was frequently observed in disturbed seasonal montane forest, dominated by *Eucalyptus urophylla*, on the upper slopes (600-900 m) of Gunung Ili Boleng, but it was not recorded elsewhere.

HILL MYNA *Gracula religiosa*

Unrecorded. Local informants revealed that trapping of Hill Mynas for the cagebird trade had caused a severe decline in wild populations of this species on Adonara.

YELLOW-SPECTACLED WHITE-EYE *Zosterops wallacei*

Restricted-range

This species was common in small flocks of up to ten individuals in coastal shrub and coconut plantations, but it was unrecorded from closed-canopy forest.

RUSSET-CAPPED TESIA *Tesia everetti*

Restricted-range

This species was recorded calling from scrubby gullies in candlenut plantations (350-450 m) and fragments of moist deciduous forest (450-700 m) on Ile Boleng. It was also present along the Wai Kenawe River. Previously known only from Sumbawa (race *sumbawana*) and Flores (*everetti*), the presence of this species was to be expected for Adonara, and fills a gap in the knowledge of its distribution. The race likely to be occurring on Adonara is *everetti*. It is probably widespread in scrub and remaining forest fragments throughout Adonara, as on Flores (Trainor and Lesmana 2000). It is apparently absent from Lembata (author's unpublished data).

BLACK-FRONTED FLOWERPECKER *Dicaeum igniferum*

Restricted-range

This was the most frequently recorded bird on Adonara, present at all sites from sea level to at least 600 m, and especially common in coconut plantations, fruit gardens and coastal scrub. More than ten individuals were seen with Yellow-spectacled White-eyes in a flowering tree at Kampung Adonara.

FLAME-BREASTED SUNBIRD *Nectarinia solaris*

Restricted-range

This species was frequent in degraded beach forest below Ile Boleng, in coconut and fruit gardens 2 km east of Waiwerang, and in moist deciduous forest at Wai Kenawe River.

EURASIAN TREE SPARROW *Passer montanus*

Introduced

This species was common in Waiwerang, abundant at Larantuka (on the adjacent Flores 'mainland'), but absent from the adjacent island of Lembata (author's unpublished data).

DISCUSSION

Avifaunal composition and affinities

Every species recorded to date from Adonara (see Appendix), excepting Olive-headed Lorikeet, is known also from Flores, highlighting the extreme avifaunal similarity caused by the geographic proximity of the two islands (during recent ice-ages, 8,000-12,000 years ago, they would have been joined: Monk *et al.* 1997). In particular, newly reported Adonara populations of the White-rumped Kingfisher and Russet-backed Tesia, which mark their easternmost distributions, illustrate this point. The occurrence of the Olive-headed Lorikeet on Adonara, but not Flores, is interesting. The Larantuka strait separating Flores from Adonara, at 1 to 4 km wide, is clearly not a geographic barrier to the natural movements of either Olive-headed Lorikeet on Adonara or to the endemic race of the Rainbow Lorikeet *Trichoglossus haematodus weberi* on Flores. Conceivably, competition excludes the respective species from the adjacent islands. Interestingly, C. Allen, an assistant of Wallace, reportedly collected several individuals of Olive-headed Lorikeet on Flores (Hartert 1898, Hellmayr 1914) although there are doubts as to the provenance of these specimens (G. Mees verbally 2001). Some authors have suggested that *weberi* of Flores is more closely related to the Olive-headed Lorikeet than to the Rainbow Lorikeet superspecies (Smith 1975).

However, more recent behavioural studies by Serpell (1989) have clarified the taxonomic relationships of *weberi*, placing it closer to Rainbow Lorikeet than Olive-headed Lorikeet.

Adonara's avifauna is notably poor, but is this just lack of survey effort? The absence of extensive mangrove, estuary, swamp forest, coastal grasslands and freshwater wetlands presumably constrains over-wintering by non-passerines, including migratory shorebirds (none was observed). The ratio of non-passerine to passerine species approaches parity on Adonara (Table 2), whereas a ratio of 2:1 is more common for the islands of Nusa Tenggara (Johnstone *et al.* 1996). Only three species of waterbird were recorded (Little Egret, Pacific Reef Egret *Egretta sacra* and Common Sandpiper *Actitis hypoleucos*) after much effort in coastal habitats. Perhaps as much as 90% of natural habitats that once occurred on Adonara have been converted to agricultural land. Formerly on Adonara, savannas dominated by *Eucalyptus alba* and Lontar palms, dry tropical forest, moist deciduous forest, and seasonal montane forest were dominant. The cumulative effect of agricultural clearance and eruptions of the Ile Boleng volcano (the last in 1974: Monk *et al.* 1997) has severely affected natural habitats and associated avifaunas.

Five passerine species from Australo-Papuan families were recorded: Wallacean Cuckooshrike, Golden-bellied Gerygone *Gerygone sulphurea*, Golden Whistler *Pachycephala pectoralis*, Zebra Finch *Taeniopygia guttata* and Helmeted Friarbird *Philemon buceroides*. Although birds with Oriental origins predominate on Adonara (for example, they represent 75% of resident passerine species), several of the Australo-Papuan species were abundant. These included three of the five most frequently recorded species. The most frequently recorded bird species from the 12 samples were Black-fronted Flowerpecker (10 of 12 lists), Helmeted Friarbird (8), Golden Whistler (8), Olive-backed Sunbird *Nectarinia jugularis* (6), Golden-bellied Gerygone *Gerygone sulphurea* (6), Black-naped Monarch *Hypothymis azurea* (5), Flame-breasted Sunbird (5), Lesser Coucal *Centropus bengalensis* (5), and Zitting Cisticola *Cisticola juncidis* (5).

Table 2. Island area, total number of bird species and percentage of non-passerine species for selected islands comprising the Northern Nusa Tenggara EBA (data from Johnstone *et al.* 1996, Coates and Bishop 1997, Verhoeve and Holmes 1999, Trainor *et al.* in press, and author's unpublished data*). Island area is from Monk *et al.* (1997).

Island	Area (km ²)	Total no. species	Percentage non-passerines	Relative survey effort
*Sika (Alor)	0.3	19	58%	High
*Kepa (Alor)	1	20	45%	Moderate
*Satonda (Sumbawa)	4	34	82%	Moderate
Sangeang (Sumbawa)	153	38	61%	Moderate
Moyo (Sumbawa)	349	87	74%	High
Adonara	497	50	48%	Low
Roti	1,226	119	70%	High
*Lembata	1,269	89	58%	Moderate
*Alor	2,125	116	62%	Low
Lombok	4,619	174	66%	Low
Flores	13,540	269	70%	High
Sumbawa	15,255	221	67%	Moderate

Bird trade

On Adonara, populations of Olive-headed Lorikeet, Yellow-crested Cockatoo, Hill Myna, Peaceful Dove *Geopelia striata*, Spotted Dove *Streptopelia chinensis*, and, according to local reports, junglefowl *Gallus* sp. are targeted for capture and trade. Local residents believe the Yellow-crested Cockatoo is nearing extinction on Adonara. Olive-headed Lorikeets are now a focus for capture, although their modest plumage ensures that they attract low prices (Rupiah 10,000-15,000 each, =USD 1.00-1.50 each). Nest sites are raided annually, and snares are used to catch adults at fruiting or flowering trees. A single Olive-headed Lorikeet (captured on Adonara) was observed in the house of a Chinese-Indonesian shopkeeper at Waiwerang, who indicated that several residents kept parrots in town. A single Purple-naped Lory *Lorius domicella* (native to Maluku) was also observed. There were no field observations of either the Hill Myna or junglefowl, but local people indicated that they are present and targeted for trade. A shop in Waiwerang held a single captive Hill Myna. Peaceful Doves and Spotted Doves are trapped for cage-birds or food, but remain common in suitable habitat. A resident of Dokeng kept ten Peaceful Doves and five Emerald Doves *Chalcophaps indica*.

A protected area proposal

In 1981, following brief field visits, the FAO/UNDP proposed an 'Adonara Nature Reserve' covering about 2,000 ha of the Ile Boleng volcano (500-1682 m) with the aim of the 'preservation of spectacular natural formation including interesting flora and fauna' (FAO/UNDP 1981). The volcano also has strong cultural importance because the Adonarese believe that their ancestors originated from within the volcano. In the intervening years, threats that the FAO/UNDP had identified, namely illegal timber collection, burning and agricultural encroachment, have resulted in conversion of forest to agriculture up to at least 800 m. On the eastern slopes, a distinctive savanna dominated by *Eucalyptus alba* still occurs. Given the lack of forest habitat remaining on Adonara, the forests and savannas of the scenic Ile Boleng volcano probably represent the best example of natural habitat on the island, and support populations of all six Nusa Tenggara endemic birds known to occur on Adonara. The area has been included as a secondary area in a recent Important Bird Area review of Nusa Tenggara (Rombang *et al.* in press). A small project advocating the relative biological and cultural merits of this area to local government and fringing villages would be of value, perhaps as part of the Nusa Tenggara IBA programme.

Suggestions for additional surveys

Although of low priority, more surveys are needed. At least two further threatened species might be expected for Adonara. BirdLife International (2001) list an 1863 record of the Vulnerable Flores Green Pigeon *Treron floriss* for Larantuka (Flores), which is tantalisingly close to Adonara. This species is present on all islands larger than 200 km² in the Solor and Alor archipelagos, except Adonara. The Endangered Flores Crow *Corvus florensis*, long-considered endemic to Flores, has recently been reported for Rinca Island (D. Agista verbally 2001) and might also occur on Adonara. There are few records

from the east of Flores (see BirdLife International 2001), but this is probably because of lack of effort. Including these two species, an additional nine restricted-range bird species could reasonably be expected to occur on Adonara (about 15 of the 29 restricted-range species occurring in the Northern Nusa Tenggara EBA). The west and the north-east of the island remain unsurveyed. There appears to be relatively extensive dry forest on limestone outcrops in the north-west, and beach forest occurs on rocky outcrops to the south and south-east of Ile Boleng. *Eucalyptus alba*-dominated savanna is accessible on the south-east slopes of Ile Boleng. The island of Solor (c.222 km²), lying 3 km south of Adonara, has not been surveyed for more than 130 years. Surveys here and on the slightly better known islands of Alor and Pantar would also be of value.

Thanks to Yami and Vero, at the Hotel Ile Boleng, Waiwerang, for their hospitality and logistical assistance, and to Helen Taylor for editing this report. The timely comments of an anonymous reviewer, and those of David Blakesley, also significantly improved the manuscript. I acknowledge also the aid of Rudyanto (BirdLife International-Asia Division) who produced the map, Jeremy Speck (BirdLife International-Cambridge) who supplied several key references, and Gerlof Mees (Busselton, Australia) who provided unpublished information.

REFERENCES

- BirdLife International (2001) *Threatened birds of Asia: the BirdLife International Red Data Book*. Cambridge, UK: BirdLife International.
- Bruce, M. D. (1987) Additions to the birds of Wallacea. 1. Bird records from smaller islands in the Lesser Sundas. *Kukila* 3: 38-44.
- Büttikofer, J. (1892) On a collection of birds from the islands of Flores, Sumba and Rotti. *Notes Leyden Mus.* 15: 193-207.
- Coates, B. J. and Bishop, K. D. (1997) *A guide to the birds of Wallacea*. Alderley, Queensland, Australia: Dove.
- FAO/UNDP (1981) *Eastern Flores Conservation Areas. Trip Report/December 1980-January 1981*. Field Report 24 of UNDP/FAO, National Parks Development Project INS/78/061. Bogor, Indonesia: FAO.
- Hartert, E. (1898) On the birds collected by Mr. Everett in south Flores. Part II. *Novit. Zool.* 5: 42-50.
- Hellmayr, C. E. (1914) Die Avifauna von Timor. Pp. 1-112 in C. B. Haniel ed. *Zoologie von Timor*. Stuttgart: Kommissionsverlag der E. Schweizerbartschen Verlagsbuchhandlung.
- Johnstone, R. E. (1994) Observations of seabirds in Nusa Tenggara (Lesser Sundas) and Moluccas, Indonesia. *Western Australian Naturalist* 19: 339-350.
- Johnstone, R.E., Jepson, ., Butchart, S., Lowen, J. and Prawiradilaga, D. (1996) The birds of Sumbawa, Moyo and Sangeang Islands, Nusa Tenggara, Indonesia. *Records W. Aust. Mus.* 18: 157-178.
- Lutz, N. M. (1998) Bilingualism and linguistic politics in Adonara, East Flores. *Anthropologi Indonesia* 56: 86-94.
- MacKinnon, J. and Phillipps, K. (1993) *A field guide to the birds of Borneo, Sumatra, Java and Bali*. Oxford: Oxford University Press.
- Mees, G. F. (1976) Some birds recorded from Timor by Salomon Muller in 1828-29. *Emu* 76: 150-151.
- Mochtar, D. (1989) *Laporan inventarisasi satwa liar Kakatua Kecil Jambul Kuning (Cacatua sulphurea) dan Beo (Gracula religiosa) di Kabupaten Flores Timur*. [Report on a survey for the Yellow-crested Cockatoo *Cacatua sulphurea* and Hill Myna *Gracula religiosa* in the East Flores district.] Kupang, Indonesia: Perlindungan Hutan dan Pelestarian Alam. (In Indonesian.)
- Monk, K. A., de Fretes, Y. and Lilley, G. (1997) *The Ecology of Nusa Tenggara and Maluku*. Singapore: Periplus Editions.
- Noya, Y. and S. Koesoemadinata. (1990) *Geologi Lembar Lomblen, Nusatenggara Timur*. [Geology of the Lomblen sheet, East Nusa

- Tenggara.] Bandung, Indonesia: Indonesian Geological Research Development Centre. (In Indonesian.)
- RePPPProT. (1989) *The land resources of Indonesia: a national overview*. Jakarta: ODA/Ministry of Transmigration.
- Rombang, W., Trainor, C. R. and Lesmana, D. (in press) *Daerah penting bagi burung di Nusa Tenggara*. [Important Bird Area Directory of Nusa Tenggara.] Bogor, Indonesia: BirdLife International – Indonesia Programme (In Indonesian.)
- Serpell, J. (1989) Visual displays and taxonomic affinities in the parrot genus *Trichoglossus*. *Biol. J. Linn. Soc.* 36: 193–211.
- Smith, G. A. (1975) Observations on *Trichoglossus haematodus*, *Amazona* and *Forpus* species. *Avicult. Mag.* 81: 237–238.
- Stattersfield, A. J., Crosby, M. J., Long, A. J. and Wege, D. C. (1998) *Endemic Bird Areas of the world: priorities for biodiversity conservation*. BirdLife Conservation Series No. 7. Cambridge, U.K: BirdLife International.
- Trainor, C. and Lesmana, D. (2000) *Exploding volcanoes, unique birds, gigantic rats and elegant ikat: identifying sites of international conservation significance on Flores, East Nusa Tenggara*. Bogor, Indonesia: BirdLife International-Indonesia Programme Report No. 18.
- Trainor, C., Martin, K., Lesmana, D., Agista, D., Drijvers, R. and Setiawan, I. (in press) New bird records for Nusa Tenggara islands: Lombok, Moyo, Sumbawa, Flores, Pulau Besar, Kojadoi, Labondeng and Timor. *Kukila*.
- Verhoeve, J. and Holmes, D. A. (1999) The birds of the islands of Flores – a review. *Kukila* 10: 3–59.
- White, C. M. N. and Bruce, M. D. (1986) *The birds of Wallacea (Sulawesi, the Moluccas & Lesser Sunda Islands Indonesia): an annotated check-list*. London: British Ornithologists' Union (Check-list no. 7).

Colin R. Trainor, BirdLife International – Indonesia Programme, PO Box 310 Boo, Bogor 16003, Indonesia. Current address: 3 Empire Court, Amula, 0812, Northern Territory, Australia. Email: halmahera@hotmail.com

APPENDIX

Preliminary list of the birds of Adonara, Lesser Sundas

	Status	Abundance	% lists	Study sites						Habitat
				1	2	3	4	5	6	
SUNDA PYGMY WOODPECKER <i>Dendrocopos moluccensis</i>	R,F	Occasional						✓	✓	E,G,H
COLLARED KINGFISHER <i>Todiramphus chloris</i>	R	Common	25	✓	✓	✓				A,B,C,D
WHITE-RUMPED KINGFISHER <i>Caridonax fulgidus</i>	R,F,rr	Frequent	25				✓	✓	✓	G,H
BLUE-TAILED BEE-EATER <i>Merops philippinus</i>	M	Occasional	16.7	✓						B
ASIAN KOEL <i>Eudynamis scolopacea</i>	R	Frequent	25					✓		G
LESSER COUCAL <i>Centropus bengalensis</i>	R	Common	41.7	✓			✓		✓	C,D,E
OLIVE-HEADED LORIKEET <i>Trichoglossus euteles</i>	R,rr	Common	25						✓	E,G,H
YELLOW-CRESTED COCKATOO <i>Cacatua sulphurea</i>	R,F,CR	*								
GLOSSY SWIFTLET <i>Collocalia esculenta</i>	R	Occasional	8.7				✓			G
BARN OWL <i>Tyto alba</i>	R			✓						A
ROCK PIGEON <i>Columba livia</i>	R,I	Abundant		✓						A
SPOTTED DOVE <i>Streptopelia chinensis</i>	R	Common	33.2	✓	✓	✓	✓	✓		A,B,C,D,E,F
BROWN CUCKOO DOVE <i>Macropygia amboinensis</i>	R,F	Uncommon	8.3				✓			E
EMERALD DOVE <i>Chalcophaps indica</i>	R,F	Frequent	25			✓	✓			B,D,E
PEACEFUL DOVE <i>Geopelia striata</i>	R	Occasional			✓	✓	✓			A,B,C,D,E
BLACK-BACKED FRUIT DOVE <i>Ptilinopus cinctus</i>	R,F	Frequent	16.6					✓	✓	G,H
BLACK-NAPED FRUIT DOVE <i>Ptilinopus melanospila</i>	R,F	Uncommon	8.3					✓		G
COMMON SANDPIPER <i>Actitis hypoleucos</i>	M	Frequent		✓						A
RUDDY TURNSTONE <i>Arenaria interpres</i>	M	*								
BRAHMINY KITE <i>Haliastur indus</i>	R	Uncommon								B
WHITE-BELLIED SEA EAGLE <i>Haliaeetus leucogaster</i>	R	Frequent		✓						A

	Status	Abundance	% lists	Study sites						Habitat
				1	2	3	4	5	6	
BONELLI'S EAGLE <i>Hieraaetus fasciatus</i>	R,F	Occasional	8.3						✓	G,H
LITTLE EGRET <i>Egretta garzetta</i>	M	Uncommon				✓				B
PACIFIC REEF EGRET <i>Egretta sacra</i>	R	Occasional		✓						A
ELEGANT PITTA <i>Pitta elegans</i>	R,F	*								
HELMETED FRIARBIRD <i>Philemon buceroides</i>	R,F	Abundant	66.7	✓	✓	✓	✓	✓	✓	A,B,C,D,E,F,G,H
GOLDEN-BELLIED GERYGONE <i>Gerygone sulphurea</i>	R	Common	50	✓		✓				A,B,C
GOLDEN WHISTLER <i>Pachycephala pectoralis</i>	R,F	Common	66.7	✓		✓	✓	✓	✓	B,C,D,E,F,G,H
LARGE-BILLED CROW <i>Corvus macrorhynchos</i>	R	Occasional		✓	✓					A,B
BLACK-NAPED ORIOLE <i>Oriolus chinensis</i>	R,F	Occasional	8.3					✓		G
WALLACEAN CUCKOOSHRIKE <i>Coracina personata</i>	R,F	Frequent	8.3						✓	G,H
SPANGLED DRONGO <i>Dicrurus hottentottus</i>	R,F	Common	41.7				✓	✓	✓	C,D,E,F,G,H
BLACK-NAPED MONARCH <i>Hypothymis azurea</i>	R,F	Common	41.7			✓	✓	✓		B,D,F,G,H
ASIAN PARADISE-FLYCATCHER <i>Terpsiphone paradisi</i>	R,F	*								
PIED BUSHCHAT <i>Saxicola caprata</i>	R	Common	16.7	✓	✓	✓				A,B,C,D
HILL MYNA <i>Gracula religiosa</i>	R,F	*								
GREAT TIT <i>Parus major</i>	R	Occasional	16.7			✓				B,D
PACIFIC SWALLOW <i>Hirundo tahitica</i>	R	Uncommon		✓						A
ZITTING CISTICOLA <i>Cisticola juncidis</i>	R	Common	41.7	✓	✓					A,B,C,D
ORIENTAL WHITE-EYE <i>Zosterops palpebrosus</i>	R,F	Common	33.2				✓	✓	✓	E,G,H
YELLOW-SPECTACLED WHITE-EYE <i>Zosterops wallacei</i>	R,rr	Occasional	8.3				✓	✓	✓	C,D,E,F,H
RUSSET-CAPPED TESIA <i>Tesia everetti</i>	R,F,rr	Common	33.2				✓	✓	✓	F,G,H
ARCTIC WARBLER <i>Phylloscopus borealis</i>	M	Frequent	33.2			✓	✓	✓	✓	B,D,F,G,H
BLACK-FRONTED FLOWERPECKER <i>Dicaeum igniferum</i>	R,rr	Abundant	83.4	✓		✓	✓	✓	✓	A,B,C,D,E,F,G
BROWN-THROATED SUNBIRD <i>Anthreptes malacensis</i>	R	Uncommon	8.3	✓						C
OLIVE-BACKED SUNBIRD <i>Nectarinia jugularis</i>	R	Abundant	50	✓		✓	✓	✓		A,B,C,D,E,F
FLAME-BREASTED SUNBIRD <i>Nectarinia solaris</i>	R,rr	Abundant	41.7	✓	✓	✓	✓	✓		A,B,C,D,E,F
EURASIAN TREE SPARROW <i>Passer montanus</i>	R, I	Abundant		✓						A
ZEBRA FINCH <i>Taeniopygia guttata</i>	R	Occasional	25	✓						C
BLACK-FACED MUNIA <i>Lonchura molucca</i>	R	Occasional	25	✓	✓	✓	✓	✓		A,B,C,D,E,F

Status

* = not recorded (historical record or occurrence indicated by local informants)

R = Resident

M = Migrant

F = Forest-dependent species

I = Introduced

rr = Restricted-range bird species with a global range of <50,000 km² (Stattersfield *et al.* 1998)

CR = Critically Endangered (BirdLife International 2001)

Abundance

These are subjective categories of relative abundance, based on the full five-day survey. Note that results given for ‘% of lists’ refer to more limited survey.

Uncommon = recorded in small numbers on four or fewer occasions

Occasional = recorded occasionally in small numbers

Frequent = recorded regularly in small numbers

Common = recorded regularly in moderate numbers

Abundant = recorded regularly in large numbers

% of lists

Percentage occurrence in 12 ten-species lists (see Methods)

Study sites

1. Waiwerang
2. Ile Boleng Beach
3. Kampung Adonara
4. Dokeng
5. Wai Kenawe River
6. Ile Boleng

Habitats

A = Village

B = Mangrove

C = Agricultural crops

D = Coastal scrub

E = Plantations (coconut and candlenut)

F = Tropical dry forest

G = Moist deciduous forest

H = Seasonal montane forest dominated by *Eucalyptus urophylla*